OPERATOR STEEL MELTING EQUIPMENTS

COMPETENCY BASED CURRICULUM

(Duration: 1 Year 3 Months)

APPRENTICESHIP TRAINING SCHEME (ATS)

NSQF LEVEL- 4

SECTOR – PRODUCTION & MANUFACTURING

GOVERNMENT OF INDIA
MINISTRY OF SKILL DEVELOPMENT & ENTREPRENEURSHIP
DIRECTORATE GENERAL OF TRAINING

OPERATOR STEEL MELTING EQUIPMENTS

(Revised in 2018)

APPRENTICESHIP TRAINING SCHEME (ATS)

NSQF LEVEL - 4

Developed By

Ministry of Skill Development and Entrepreneurship
Directorate General of Training
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1. BACKGROUND

1.1 Apprenticeship Training Scheme under Apprentice Act 1961

The Apprentices Act, 1961 was enacted with the objective of regulating the programme of training of apprentices in the industry by utilizing the facilities available therein for imparting on-the-job training. The Act makes it obligatory for employers in specified industries to engage apprentices in designated trades to impart Apprenticeship Training on the job in industry to school leavers and person having National Trade Certificate(ITI pass-outs) issued by National Council for Vocational Training (NCVT) to develop skilled manpower for the industry**.** There are four categories of apprentices namely**; trade apprentice, graduate, technician and technician (vocational) apprentices.**

Qualifications and period of apprenticeship training of **trade apprentices** vary from trade to trade. The apprenticeship training for trade apprentices consists of basic training followed by practical training. At the end of the training, the apprentices are required to appear in a trade test conducted by NCVT and those successful in the trade tests are awarded the National Apprenticeship Certificate.

The period of apprenticeship training for graduate (engineers), technician (diploma holders and technician (vocational) apprentices is one year. Certificates are awarded on completion of training by the Department of Education, Ministry of Human Resource Development.

1.2 Changes in Industrial Scenario

Recently we have seen huge changes in the Indian industry. The Indian Industry registered an impressive growth during the last decade and half. The number of industries in India have increased manifold in the last fifteen years especially in services and manufacturing sectors. It has been realized that India would become a prosperous and a modern state by raising skill levels, including by engaging a larger proportion of apprentices, will be critical to success; as will stronger collaboration between industry and the trainees to ensure the supply of skilled workforce and drive development through employment. Various initiatives to build up an adequate infrastructure for rapid industrialization and improve the industrial scenario in India have been taken.

1.3 Reformation

The Apprentices Act, 1961 has been amended and brought into effect from 22nd December, 2014 to make it more responsive to industry and youth. Key amendments are as given below:

- Prescription of number of apprentices to be engaged at establishment level instead of trade-wise.
- Establishment can also engage apprentices in optional trades which are not designated, with the discretion of entry level qualification and syllabus.
- Scope has been extended also to non-engineering occupations.
- Establishments have been permitted to outsource basic training in an institute of their choice.
- The burden of compliance on industry has been reduced significantly.

2. TRAINING SYSTEM

2.1 GENERAL

Directorate General of Training (DGT) under Ministry of Skill Development & Entrepreneurship offers range of vocational training courses catering to the need of different sectors of economy/ Labour market. The vocational training programmes are delivered under aegis of National Council of Vocational Training (NCVT). Craftsman Training Scheme (CTS) and Apprenticeship Training Scheme (ATS) are two pioneer programmes of NCVT for propagating vocational training.

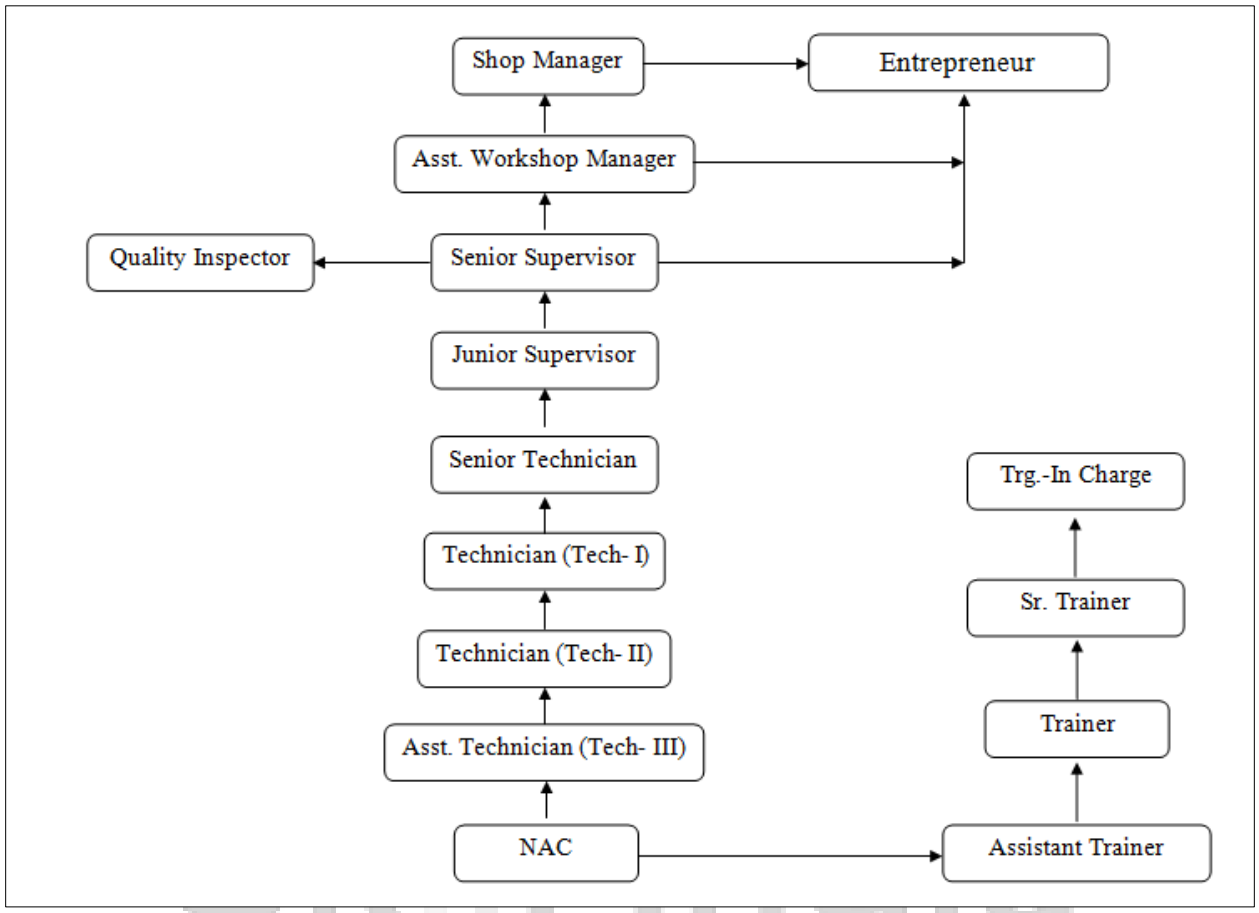
Operator Steel Melting Equipments trade under ATS is one of the most popular courses delivered nationwide through different industries. The course is of 3 months + 1 year duration (01 Block of 15months including basic training). It mainly consists of Domain area and Core area. In the Domain area Trade Theory & Practical impart professional - skills and knowledge, while Core area - Workshop Calculation and science, Engineering Drawing and Employability Skills imparts requisite core skills & knowledge and life skills. After passing out the training programme, the trainee is being awarded National Apprenticeship Certificate (NAC) by NCVT having worldwide recognition.

Broadly candidates need to demonstrate that they are able to:

- Read & interpret technical parameters/document, plan and organize work processes, identify necessary materials and tools;
- Perform task with due consideration to safety rules, accident prevention regulations and environmental protection stipulations;
- Apply professional skill, knowledge, core skills & employability skills while performing jobs and solve problem during execution.
- Check the job/assembly as per drawing for functioning, identify and rectify errors in job/assembly.
- Document the technical parameters related to the task undertaken.

2.2 CAREER PROGRESSION PATHWAYS:

- Indicative pathways for vertical mobility.



2.3 COURSE STRUCTURE:

Table below depicts the distribution of training hours across various course elements during a period of one year (*Basic Training and On-Job Training*) : -

Total training duration details: -

Time (in months)	**1-3**	**4 - 15**
Basic Training	**Block– I**	**-----**
Practical Training (On - job training)	**----**	**Block – I**

A. Basic Training

For 02 yrs. course (Engg.) :-(**Total 06 months:** 03 months in 1st yr. + 03 months in 2nd yr.)
For 01 yr. course (Engg.) :-(**Total 03 months:** 03 months in 1st yr.)

S No.	Course Element	Total Notional Training Hours	
		For 02 Yrs. course	For 01 Yr. course
1.	Professional Skill (Trade Practical)	550	275
2.	Professional Knowledge (Trade Theory)	240	120
3.	Workshop Calculation & Science	40	20
4.	Engineering Drawing	60	30
5.	Employability Skills	110	55
	Total (Including internal assessment)	**1000**	**500**

B. On-Job Training:-

For 02 yrs. Course (Engg.) :-(**Total 18 months:** 09 months in 1st yr. + 09 months in 2nd yr.)

Notional Training Hours for On-Job Training: 3120 Hrs.

For 01 yr. course (Engg.) :-(**Total 12 months**)

Notional Training Hours for On-Job Training: 2080 Hrs.

C. Total training hours:-

Duration	Basic Training	On-Job Training	Total
For 02 yrs. course (Engg.)	1000 hrs.	3120 hrs.	4120 hrs.
For 01 yr. course (Engg.)	500 hrs.	2080 hrs.	2580 hrs.

2.4 ASSESSMENT & CERTIFICATION:

The trainee will be tested for his skill, knowledge and attitude during the period of course and at the end of the training programme as notified by Govt of India from time to time. The Employability skills will be tested in first two semesters only.

a) The **Internal assessment** during the period of training will be done by **Formative assessment method** by testing for assessment criteria listed against learning outcomes. The training institute have to maintain individual *trainee portfolio* as detailed in assessment guideline. The marks of internal assessment will be as per the template (Annexure – II).

b) The final assessment will be in the form of summative assessment method. The All India Trade Test for awarding NAC will be conducted by NCVT on completion of course as per guideline of Govt of India. The pattern and marking structure is being notified by govt of India from time to time. **The learning outcome and assessment criteria will be basis for setting question papers for final assessment. The examiner during final examination will also check** individual trainee's profile as detailed in assessment guideline before giving marks for practical examination.

2.4.1 PASS REGULATION

The minimum pass percent for Practical is 60% & minimum pass percent for Theory subjects 40%. The candidate pass in each subject conducted under all India trade test.

2.4.2 ASSESSMENT GUIDELINE

Appropriate arrangements should be made to ensure that there will be no artificial barriers to assessment. The nature of special needs should be taken into account while undertaking assessment. Due consideration should be given while assessing for team work, avoidance/reduction of scrap/wastage and disposal of scarp/wastage as per procedure, behavioral attitude, sensitivity to environment and regularity in training. The sensitivity towards OSHE and self-learning attitude are to be considered while assessing competency.

Assessment will be evidence based comprising the following:

- Job carried out in labs/workshop
- Record book/ daily diary
- Answer sheet of assessment
- Viva-voce
- Progress chart
- Attendance and punctuality
- Assignment
- Project work

Evidences of internal assessments are to be preserved until forthcoming semester examination for audit and verification by examination body. The following marking pattern to be adopted while assessing:

Performance Level	Evidence
(a) Weightage in the range of 60 -75% to be allotted during assessment	
For performance in this grade, the candidate	• Demonstration of good skill in the use of

with occasional guidance and showing due regard for safety procedures and practices, has produced work which demonstrates attainment of an acceptable standard of craftsmanship.	hand tools, machine tools and workshop equipment • Below 70% tolerance dimension/accuracy achieved while undertaking different work with those demanded by the component/job/set standards. • A fairly good level of neatness and consistency in the finish • Occasional support in completing the project/job.
(b)Weightage in the range of above75% - 90% to be allotted during assessment	
For this grade, the candidate, with little guidance and showing due regard for safety procedures and practices, has produced work which demonstrates attainment of a reasonable standard of craftsmanship.	• Good skill levels in the use of hand tools, machine tools and workshop equipment • 70-80% tolerance dimension/accuracy achieved while undertaking different work with those demanded by the component/job/set standards. • A good level of neatness and consistency in the finish • Little support in completing the project/job
(c) Weightage in the range of above 90% to be allotted during assessment	
For performance in this grade, the candidate, with minimal or no support in organization and execution and with due regard for safety procedures and practices, has produced work which demonstrates attainment of a high standard of craftsmanship.	• High skill levels in the use of hand tools, machine tools and workshop equipment • Above 80% tolerance dimension/accuracy achieved while undertaking different work with those demanded by the component/job/set standards. • A high level of neatness and consistency in the finish. • Minimal or no support in completing the project.

3. JOB ROLE

Brief description of Job roles of Operator Steel Melting Equipments

Operates and maintain different operation of steel melting shop, starting from unloading of hot metal, desulphurization process operation and DS slag handling, primary steel making operation. Executes different flux handling operation, secondary steel making operation (Ladle furnace and RH operation). Ladle preparation and ladle handling operation. Refractory maintenance. Caster Operation, operations of different caster equipment. Slab and billet caster handling and dispatch.

In addition Operator Steel Melting Equipments have the ability to visualize the job, good coordination, mechanical attitude, manual dexterity and perform work related mathematical calculations.

Plan and organize assigned work and detect & resolve issues during execution. Demonstrate possible solutions and agree tasks within the team. Communicate with required clarity and understand technical English. Sensitive to environment, self-learning and productivity

May be designated as Operator Steel Melting Equipments according to nature of work done

Reference NCO: 8121.35 - Convertor Blower/Convertor Blower Technician

4. NSQF LEVEL COMPLIANCE

NSQF level for Operator Steel Melting Equipments trade under ATS: **Level 4**

As per notification issued by Govt. of India dated- 27.12.2013 on National Skill Qualification Framework total 10 (Ten) Levels are defined.

Each level of the NSQF is associated with a set of descriptors made up of five outcome statements, which describe in general terms, the minimum knowledge, skills and attributes that a learner needs to acquire in order to be certified for that level.

Each level of the NSQF is described by a statement of learning outcomes in five domains, known as level descriptors. These five domains are:

a. Process
b. professional knowledge,
c. professional skill,
d. core skill and
e. Responsibility.

The Broad Learning outcome of Operator Steel Melting Equipments trade under ATS mostly matches with the Level descriptor at Level- 4.

The NSQF level-4 descriptor is given below:

Level	Process Required	Professional Knowledge	Professional Skill	Core Skill	Responsibility
Level 4	Work in familiar, predictable, routine, situation of clear choice.	Factual knowledge of field of knowledge or study	Recall and demonstrate practical skill, routine and repetitive in narrow range of application, using appropriate rule and tool, using quality concepts	Language to communicate written or oral, with required clarity, skill to basic Arithmetic and algebraic principles, basic understanding of social political and natural environment.	Responsibility for own work and learning.

5. GENERAL INFORMATION

Name of the Trade	Operator Steel Melting Equipments
NCO - 2015	**8121.35**
NSQF Level	Level – 4
Duration of Apprenticeship Training (Basic Training + On-Job Training)	3 months + One year (01 Block of 15 months duration including basic training).
Duration of Basic Training	a) Block –I : 3 months **Total duration of Basic Training: 3 months**
Duration of On-Job Training	a) Block–I: 12 months **Total duration of Practical Training: 12 months**
Entry Qualification	Passed 10th Class with Science and Mathematics under 10+2 system of Education or its equivalent
Selection of Apprenticeship	The apprentices will be selected as per Apprenticeship Act amended time to time.
Instructors Qualification for Basic Training	As per ITI instructors qualifications as amended time to time for the specific trade.
Infrastructure for basic training	As per related trade of ITI
Examination	The internal examination/ assessment will be held on completion of each block. Final examination for all subjects will be held at the end of course and same will be conducted by NCVT.
Rebate to Ex-ITI Trainees	03 months
CTS trades eligible for Operator Steel Melting Equipments Apprenticeship	--

Note:

- *Industry may impart training as per above time schedule for different block, however this is not fixed. The industry may adjust the duration of training considering the fact that all the components under the syllabus must be covered. However the flexibility should be given keeping in view that no safety aspects is compromised.*
- *For imparting Basic Training the industry to tie-up with ITIs having such specific trade and affiliated to NCVT.*

6. LEARNING OUTCOME

6.1 GENERIC LEARNING OUTCOME

The following are minimum broad Common Occupational Skills/ Generic Learning Outcome after completion of the Operator Steel Melting Equipments course of 3 months + One year (01 Block of 15 months duration including basic training) under ATS.

Block I:-

1. Recognize & comply safe working practices, environment regulation and housekeeping.
2. Understand and explain different mathematical calculation & science in the field of study including basic electrical. *[Different mathematical calculation & science –Unit, Heat & Temperature, heat transmission, metals and non metals, properties of metals, properties of matter, Power transmission]*
3. Interpret specifications, different engineering drawing and apply for different application in the field of work. *[Different engineering drawing-Geometrical construction, Layout, Method of representation, Symbol, scales, free hand drawing, Machined components & different thread forms, Assembly drawing, screw threads, locking nuts, Permanent fastening devices, Electrical & electronic symbol]*
4. Select and ascertain measuring instrument and measure dimension of components and record data.
5. Explain the concept in productivity, quality tools, and labour welfare legislation and apply such in day to day work to improve productivity & quality.
6. Explain energy conservation, global warming and pollution and contribute in day to day work by optimally using available resources.
7. Explain personnel finance, entrepreneurship and manage/organize related task in day to day work for personal & societal growth.
8. Plan and organize the work related to the occupation.

6.2 SPECIFIC LEARNING OUTCOME

Block – I

1. Read the safety signs, symbols and interpret the meaning of them and practice the precautions to be followed in general, personnel workshop safety.
2. Practice the preventive measures to be followed to avoid electrical accidents and Practice to use the first aid kits, fire extinguishers.
3. Understand environment, environment Pollution, Pollutants, types and Practice the disposal procedure of waste materials to use it effectively without causing much environment pollution
4. Operate the mixer and clean the mixer after the job used in the blast furnace.

5. Perform the different types of converting operations, involving hot metal, scrap, temperature, tap hole.
6. Dismantle or remove worn out broken or defective parts using proper hand tools and replace them by repaired or new one, to ensure correct performance.
7. Perform the bulk materials system operation at different levels and handle the scrap materials
8. Perform the machine preparation job for different caster operation, clean the mould, oil, ladle nozzle cleaning.
9. Practice on different types of caster operations, Involving caster machine, steel ladles, rice hush, steel flow etc. Practice on different types of caster operations, Involving caster machine, steel ladles, rice hush, steel flow etc.
10. Operate the calcinations plant, operate motorized valves, burner light up and gas line water sealing.
11. Perform the quality check on the finished products
12. Prepare different types of documentation as per industrial need by different methods of recording information.

Note: *Learning outcomes are reflection of total competencies of a trainee and assessment will be carried out as per assessment criteria.*

7. LEARNING OUTCOME WITH ASSESSMENT CRITERIA

GENERIC LEARNING OUTCOME	
LEARNING OUTCOMES	**ASSESSMENT CRITERIA**
1. Recognize & comply safe working practices, environment regulation and housekeeping.	1. 1. Follow and maintain procedures to achieve a safe working environment in line with occupational health and safety regulations and requirements.
	1. 2. Recognize and report all unsafe situations according to site policy.
	1. 3. Identify and take necessary precautions on fire and safety hazards and report according to site policy and procedures.
	1. 4. Identify, handle and store / dispose off dangerous/unsalvageable goods and substances according to site policy and procedures following safety regulations and requirements.
	1. 5. Identify and observe site policies and procedures in regard to illness or accident.
	1. 6. Identify safety alarms accurately.
	1. 7. Report supervisor/ Competent of authority in the event of accident or sickness of any staff and record accident details correctly according to site accident/injury procedures.
	1. 8. Identify and observe site evacuation procedures according to site policy.
	1. 9. Identify Personal Productive Equipment (PPE) and use the same as per related working environment.
	1. 10. Identify basic first aid and use them under different circumstances.
	1. 11. Identify different fire extinguisher and use the same as per requirement.
	1. 12. Identify environmental pollution & contribute to avoidance of same.
	1. 13. Take opportunities to use energy and materials in an environmentally friendly manner
	1. 14. Avoid waste and dispose waste as per procedure
	1. 15. Recognize different components of 5S and apply the same in the working environment.
2. Understand, explain different mathematical calculation & science in the field of study	2.1 Explain concept of basic science related to the field such as Material science, Mass, weight, density, speed, velocity, heat & temperature, force, motion, pressure, heat treatment, centre of gravity, friction.

including basic electrical and apply in day to day work. *[Different mathematical calculation & science –Unit, Heat & Temperature, heat transmission, metals and non metals, properties of matels, properties of matter, Power transmission]*	2.2 Measure dimensions as per drawing
	2.3 Use scale/ tapes to measure for fitting to specification.
	2.4 Comply given tolerance.
	2.5 Prepare list of appropriate materials by interpreting detail drawings and determine quantities of such materials.
	2.6 Ensure dimensional accuracy of assembly by using different instruments/gauges.
	2.7 Explain basic electricity, insulation & earthing.
3. Interpret specifications, different engineering drawing and apply for different application in the field of work. *[Different engineering drawing-Geometrical construction, Layout, Method of representation, Symbol, scales, free hand drawing, Machined components & different thread forms, Assembly drawing, screw threads, locking nuts, Permanent fastening devices]*	3. 1. Read & interpret the information on drawings and apply in executing practical work.
	3. 2. Read & analyse the specification to ascertain the material requirement, tools, and machining /assembly /maintenance parameters.
	3. 3. Encounter drawings with missing/unspecified key information and make own calculations to fill in missing dimension/parameters to carry out the work.
4. Select and ascertain measuring instrument and measure dimension of components and record data.	4.1 Select appropriate measuring instruments as per tool list.
	4.2 Ascertain the functionality & correctness of the instrument.
	4.3 Measure dimension of the components & record data to analyse the with given drawing/measurement.
5. Explain the concept in productivity, quality tools, and labour welfare legislation and apply such in day to day work to improve productivity & quality.	5.1 Explain the concept of productivity and quality tools and apply during execution of job.
	5.2 Understand the basic concept of labour welfare legislation and adhere to responsibilities and remain sensitive towards such laws.
	5.3 Knows benefits guaranteed under various acts

6. Explain energy conservation, global warming and pollution and contribute in day to day work by optimally using available resources.	6.1 Explain the concept of energy conservation, global warming, pollution and utilize the available recourses optimally & remain sensitive to avoid environment pollution.
	6.2 Dispose waste following standard procedure.
7. Explain personnel finance, entrepreneurship and manage/organize related task in day to day work for personal & societal growth.	7. 1. Explain personnel finance and entrepreneurship.
	7. 2. Explain role of Various Schemes and Institutes for self-employment i.e. DIC, SIDA, SISI, NSIC, SIDO, Idea for financing/ non financing support agencies to familiarizes with the Policies /Programmes & procedure & the available scheme.
	7. 3. Prepare Project report to become an entrepreneur for submission to financial institutions.
8. Plan and organize the work related to the occupation.	8. 1. Use documents, drawings and recognize hazards in the work site.
	8. 2. Plan workplace/ assembly location with due consideration to operational stipulation
	8. 3. Communicate effectively with others and plan project tasks
	8. 4. Assign roles and responsibilities of the co-trainees for execution of the task effectively and monitor the same.

SPECIFIC OUTCOME

Block-I

*Assessment Criteria i.e. the standard of performance, for each specific learning outcome mentioned under **block – I** (section: 10) must ensure that the trainee works in familiar surroundings where nature of job is routine type, situation of clear choice & predictable. Assessment criteria should broadly cover the aspect of **Planning** (Identify, ascertain, etc.); **Execution** (apply factual knowledge of field of knowledge, recall and demonstrate practical skill during performing the work in routine and repetitive in narrow range of application, using appropriate rule and tool, complying basic arithmetic and algebraic principles and language to communicate in written or oral with required clarity); **Checking/ Testing** to ensure functionality during the assessment of each outcome. The assessments parameters must also ascertain that the candidate is responsible for his/her own work and learning.*

8. SYLLABUS

BASIC TRAINING (Block – I)

Duration: (03) Three Months

Week No.	Professional Skills (Trade Practical)	Professional Knowledge (Trade Theory)
1.	Safety: - its importance, classification, personal, general, workshop and job safety. Occupational health and safety. Basic injury prevention, Basic first aid, Hazard identification and avoidance, safety signs for Danger, Warning, caution & personal safety message. Preventive measures for electrical accidents & steps to be taken in such accidents. Importance of housekeeping & good shop floor practices. Disposal procedure of waste materials like cotton waste, metal chips/burrs etc. Fire& safety: Use of Fire extinguishers. Safety regarding working with different types of steam and its First-Aid.	Importance of safety and general precautions observed in the in the industry/shop floor. All necessary guidance to be provided to the new comers to become familiar with the working of Institute system including stores procedures. Introduction of First aid. Safety attitude development of the trainee by educating him to use Personal Protective Equipment (PPE). Response to emergencies e.g.; power failure, fire, and system failure. Accidents- Definition types and causes. First-Aid, nature and causes of injury and utilization of first-aid. Introduction to 5S concept & its application. Fire: - Types, causes and prevention methods. Fire Extinguisher, its types. Define environment, environment Pollution, Pollutants, type of Pollution (Air pollution, water pollution, soil pollution noise pollution, thermal pollution, radiation. Global warming its causes and remedies. Industrial Waste its types, sources and waste Management.
2 .	Video demo of the related processes	**Induction & Safety Training** Company Profile, Significance of Steel Business Plant familiarization, Layout, Product Mix, Objectives. Safety, Health & Environment Awareness Basic skill development training on Use of Tools, Basic Measuring Instruments, Coupling & Alignment, Welding, Gas Cutting.
3.	Video demo of safety & orientation at sms processes	**Safety & Orientation at SMS** • Safety instruction Of SMS • Gas Safety & Protocol.

		• Fire fighting system. • Use of different conveyor Belts & its practical approaches • Hazards related to Liquid Iron & Steels • Safety Precaution of Fork Lift. • System permits & Shutdown.
4.	Practice on mixer operation.	**Mixer Operation** • Introduction to Mixer. • Charging Of Blast Furnace Load to Mixer. • Mixer Operation. • Mixer Burner Gas Control System. • Safe Movement of Hot Metal Ladle (Basic Oxygen Furnace). • Ladle Drier. • Mixer Top Jam Cleaning and Its Preparation. • Mixer Body & Floor Cleaning. • Ladle Hooking. • House Keeping. • Safety Instruction, Precaution & Permits.
5.	Video demo of the converter operating processes Practice on different types of converting operations. (involving hot metal, scrap, temperature, tap hole etc.)	**Converter operation** • Introduction to Converters. • Charging of Hot Metal and Scrap. • Sample and Temperature Measurement. • Movement of Transfer Car & De-slagging • Knowledge of Lancing and Lance Jam Cutting. • Operation of Lining Breaking Machine, Fork Lift, Pay Loader Etc. • Tap Hole Preparation. • Recycled Metal Handling. • Operation of Slag Arrester. • Safety Procedures & Quality of Output
2.	video demo of the bulk material & scrap operating processes	**Bulk Material & Scrap Operation** • Introduction to Bulk Material System & Scrap Charging. • Identification of Different Ferro Alloys. • Operation of Fork Lift. • System of Loading Ferro-Alloy In Converter Bunkers • BMS (Bulk Materials System) Operation at Different Levels and Jam Cleaning. • Scrap Transfer Car Operation & Semi Portal

		Crane Handling • Steps of Scrap Box Handling. • House Keeping.
3.	video demo of the related processes	**Secondary Refining of Steel** Introduction to Pit side & Ladle Furnace Operation **Ladle Furnace Operation:** Ladle to Ladle Furnace Ladle Furnace Co-Ordination for Entering of Steel Operation and Different Ferro Alloy Addition Despatch of Heat with Addition of Rice Husk. Electrode Slipping and Addition. Loading of Ferro-Alloys in Different Bunkers. Lancing of Jams in Different Areas. Releasing of Sticker Pots. **Safety in handling of Derailment.**
4.	**video demo of the caster operating processes** Practice on different types of caster operations. (Involving caster machine, steel ladles, rice hush, steel flow etc.)	**Caster Operation (CCP):** • Introduction to Different Machines (Casters). • Receiving of Steel Ladles from Ladle Furnace / Converters. • Handling of Steel Ladles with Transfer Cars • Despatch of Heats with Addition of Rice Husk • Placement of Steel Ladle at Turret, Cylinder Fixing, Ladle • Nozzle Opening, Control of Steel Flow
5.	Practice on different types of caster operations.	**Caster Operation (CCP):** • Sample and Temperature Taking • Start of Casting both in Auto and Manual Mode • Emergency Launder Handling • Mould Cleaning, Oil & Powder Addition During Casting • Machine Preparation (Mould Changing, Jam Cleaning by Lancing & Gas Cutting, Spray Nozzle Cleaning / Changing, Spray Pipe Changing, Dummy Bar Preparation, Dummy Bar Insertion Etc.) • Slag Dumping. Ladle Nozzle Cleaning
6.	Practice on different types of caster operations. (Involving casting, tundish, nozzle alignment, slag post etc.)	**Caster Operation (CCP):** • Control Desks Operation • Tundish Management (Release of Skull after Casting, Tundish Preparation,

		Tundish Heating, Nozzle Alignment etc.) • Receiving And Placement Of Slag pots On Slag pot Transfer Cars • Knowledge Of Despatch • Mould Management (Cleaning, Placement, Water Checking, Other Preparatory Jobs) • Housekeeping • Quality factors
7.	Practice on Calcination plant operation.	**Calcination Plant Operation** • Safe working practices. • Introduction to different Kilns. • Practical application of safety in gas & related equipments (Operation of motorized valves, burner light up & gas line water sealing) • Housekeeping.
8.	Video demo of the dispatch area.	**Despatch Area** • Safe working practices**.** • Quality Awareness. • Marking procedures.
9.	**Revision& Internal Assessment**	

Note: - *More emphasis to be given on video/real-life pictures during theoretical classes. Some real-life pictures/videos of related industry operations may be shown to the trainees to give a feel of Industry and their future assignment.*

9. SYLLABUS - CORE SKILLS

9.1 WORKSHOP CALCULATION SCIENCE & ENGINEERING DRAWING

Block – I		
Sl. No.	**Workshop Calculation and Science (Duration: - 20 hrs.)**	**Engineering Drawing (Duration: - 30 hrs.)**
1.	Applied workshop problems involving simple addition, subtraction, multiplication, division and common fractions.	Introduction to Engineering drawing, its importance and uses in engineering fields. Simple definitions of Points, Lines, Parallel straight lines.
2.	Science- Definition, Nomenclature, various branches, significance and definitions of important terms.	Geometrical construction of Square, Rectangle, Triangle, Circle, Polygons, etc.
3.	Rounding of decimal values, use of approximation.	Drawing different types of lines.
4.	Units – Definition, fundamental & derived units, system of units- FPS, CGS, MKS and SI units of some important parameters- Length , mass, time, density, current, voltage, pressure etc. Unit conversion.	Free hand sketch of Hand tools used in the trade.
5.	Workshop problems related to average.	Screw Threads – Forms of Various Screw threads used in general in the industry – Nomenclature, convention
6.	Workshop problems related to percentage.	Fastening Devices – Temporary and Permanent. Meaning and difference. Temporary Device – Hexagonal Bolt, Nut, Check Nut, Washer.
7.	Workshop problems related to ratio and proportion.	Different Methods of Preventions of rotation of Bolts - Check nut, Square headed bolt, Square headed bolt with square neck, cup headed bolt, Eye bolt, counter sunk headed bolt, rag bolt, etc.
8.	Workshop problems related on time & work.	Different Methods of locking of nuts :- a) Lock nuts, b) Split pin, c) Slotted nut, d) Symmonds nut, e) Castle nut**, f**) Wings nut, etc.
9.	Profit & Loss and problems concerning to workshop practices.	Permanent Fastening Devices- Rivets – different parts and their types Different types of rivet heads.
10.	Properties of Matter- Different types of Properties of Matter e.g.	Rivets Joints – Lap joint and Butt or Strap joint.

	Mechanical, Electrical, Chemical, Magnetic.	Lap Joint – a) Single Riveted, b) Double riveted, i) Chain, ii) zig – zag Butt Joint – a) Single plate or strap, b) Double plate or strap
11.	Properties of Matter (Mechanical) - Tenacity, Toughness, Malleability, Ductility, Elasticity, Plasticity, Brittleness, Hardness (concept & definition)	Keys and Cotter Joints, Difference between Keys and Cotters, Different types of Keys.
12.	Properties and uses of copper, zinc, lead, tin, aluminum, brass, bronze, solder, bearing metals, timber, and rubber.	---
13.	Engineering Material- Introduction, classification, Metallic- Non metallic material, physical and mechanical properties,	---
14.	Heat & temperature- Definition and its importance. Scales of Temperature, e.g. Fahrenheit, Centigrade, Kelvin- relationship between them.	---
15.	Transmission of heat- Conduction, Convection and Radiation. Examples from Industries (concept & definition)	---
16.	Transmission of Power and motion of Belt and Pulleys:- Driver and Follower – Open and Cross belt system of belt drives. Velocity ratio. Power Transmission by belt – Problems	---

9.2 EMPLOYABILITY SKILLS

DURATION- 55 HRS.

Topic No.	Topic	Duration (in hours)
	English Literacy	**7**
1.	Reading **Reading and understanding simple sentences about self, work and environment**	
2.	Writing **Construction of simple sentences Writing simple English**	
3.	Speaking / Spoken English **Speaking with preparation on self, on family, on friends/ classmates, on know, picture reading gain confidence through role-playing and discussions on current happening job description, asking about someone's job habitual actions. Taking messages, passing messages on and filling in message forms Greeting and introductions office hospitality, Resumes or curriculum vita essential parts, letters of application reference to previous communication.**	
	I.T. Literacy	**10**
1.	Basics of Computer **Introduction, Computer and its applications, Hardware and peripherals, Switching on-Starting and shutting down of computer.**	
2.	Word processing and Worksheet **Basic operating of Word Processing, Creating, opening and closing Documents, use of shortcuts, Creating and Editing of Text, Formatting the Text, Insertion & creation of Tables. Printing document.** **Basics of Excel worksheet, understanding basic commands, creating simple worksheets, understanding sample worksheets, use of simple formulas and functions, Printing of simple excel sheets.** **Use of External memory like pen drive, CD, DVD etc,**	
3.	Computer Networking and INTERNET **Accessing the Internet using Web Browser, Downloading and Printing Web Pages, Opening an email account and use of email. Social media sites and its implication.**	
	Communication Skill	**18**
1	Introduction to Communication Skills **Communication and its importance** **Principles of Effective communication** **Types of communication - verbal, nonverbal, written, email, talking on phone.** **Nonverbal communication - components-Para-language** **Body - language**	

	Barriers to communication and dealing with barriers.	
2	Listening Skills **Listening-hearing and listening, effective listening, barriers to effective listening guidelines for effective listening.**	
3	Motivational Training **Characteristics Essential to Achieving Success** **The Power of Positive Attitude** **Self awareness** **Importance of Commitment** **Ethics and Values** **Ways to Motivate Oneself** **Personal Goal setting and Employability Planning.**	
4	Facing Interviews **Manners, Etiquettes, Dress code for an interview** **Do's & Don'ts for an interview**	
	Entrepreneurship skill	**8**
1.	**Concept of Entrepreneurship** **Entrepreneurship- Entrepreneurship - Enterprises:-Conceptual issue.** **Source of business ideas, Entrepreneurial opportunities, The process of setting up a business.**	
2.	Institutions Support **Role of Various Schemes and Institutes for self-employment i.e. DIC, SIDA, SISI, NSIC, SIDO, Idea for financing/ non financing support agencies to familiarizes with the Policies /Programmes & procedure & the available scheme.**	
	Productivity	
1.	**Productivity** Definition, Necessity.	
2.	**Affecting Factors** Skills, Working Aids, Automation, Environment, Motivation How improves or slows down.	
3.	**Personal Finance Management** Banking processes, Handling ATM, KYC registration, safe cash handling, Personal risk and Insurance.	
	Occupational Safety, Health & Environment Education	**6**
1	Safety & Health **Introduction to Occupational Safety and Health importance of safety and health at workplace.**	
2	Occupational Hazards **Basic Hazards, Chemical Hazards, Vibro-acoustic Hazards, Mechanical Hazards, Electrical Hazards, Thermal Hazards. Occupational health, Occupational hygienic, Occupational Diseases/ Disorders & its prevention.**	

3	Accident & safety **Basic principles for protective equipment.** **Accident Prevention techniques - control of accidents andsafety measures.**	
4	First Aid **Care of injured & Sick at the workplaces, First-Aid & Transportation of sick person**	
	Labour Welfare Legislation	
1	Welfare Acts **Benefits guaranteed under various acts- Factories Act, Apprenticeship Act, Employees State Insurance Act (ESI), Employees Provident Fund Act.**	
	Quality Tools	**6**
1.	**Quality Consciousness :** Meaning of quality, Quality Characteristic	
2.	**Quality Circles :** **Definition, Advantage of small group activity, objectives of quality Circle, Roles and function of Quality Circles in Organization, Operation of Quality circle. Approaches to starting Quality Circles, Steps for continuation Quality Circles.**	
3.	**House Keeping :** **Purpose of Housekeeping, Practice of good Housekeeping.**	
4.	Quality Tools **Basic quality tools with a few examples**	

10. DETAILS OF COMPETENCIES (ON-JOBTRAINING)

The **competencies/ specific outcomes** on completion of On-Job Training are detailed below: -

Block – I

1. **Safety & Orientation at SMS: -**
   - Use of Personal protective equipments
   - Use of Gas Safety devices
   - Use of fire fighting equipments.
   - Lay out of SMS, Assembly point, Emergency exits.
   - Identification of Hazardous & critical Equipments
   - Chemical Hazards & Scale hazards
   - Hazards related to Liquid Iron & Steels
   - Use of conveyor Belts & its practical approaches.
2. **Mixer Operation:**
   - Gas Control System. Charging Of Blast Furnace Load to Mixer.
   - Mixer Operation.
   - Mixer Burner
   - Safe Movement of Hot Metal Ladle (Basic Oxygen Furnace).
   - Ladle Drier Handling.
   - Mixer Top Jam Cleaning and Its Preparation.
   - Mixer Body & Floor Cleaning.
   - Ladle Hooking.
   - Handling Of Hot Metal Ladles
   - Knowledge of Hot Metal & BF (Blast Furnace) Ladles.
   - Lancing Operation
   - House Keeping.
3. **Converter operation:**
   - Charging of Hot Metal and Scrap.
   - Sample and Temperature Measurement.
   - Movement Of Transfer Car & De-slagging
   - Oxygen Lancing and Cleaning of Lance Pipe.
   - Operation of Lining Breaking Machine, Fork Lift, Pay Loader Etc.
   - Tap Hole Preparation.
   - Recycled Metal Handling.
   - Operation of Slag Arrester.
   - Converter Track Cleaning, House Keeping.
   - Inert Gas Purging (Ar/N_2)
   - Ferro-Alloy Addition.
4. **Bulk Material & Scrap Operation:**
   - Identification of Different Ferro Alloys.
   - Operation of Fork Lift.

- System of Loading Ferro-Alloy In Converter Bunkers
- BMS (Bulk Materials System) Operation at Different Levels and Jam Cleaning.
- Scrap Handling & Accounting
- Scrap Transfer Car Operation & Semi Portal Crane Handling
- Scrap Box Handling.
- Lime Handling Cleaning &House Keeping.

5. **Secondary Refining of Steel**
6. **Ladle Furnace Operation:**
   - Co-Ordination for Entering of Steel Ladle to Ladle Furnace
   - Ladle Furnace Operation and Different Ferro Alloy Addition
   - Despatch of Heat with Addition of Rice Husk.
   - Electrode Slipping and Addition.
   - Loading of Ferro-Alloys in Different Bunkers.
   - Lancing of Jams in Different Areas.
   - Handling of Steel Ladles with Transfer Cars, Cranes and Driers
   - Ladle Preparation, Nozzle Washing & Porous Plug Cleaning.
   - Ladle management & Slide gate mechanism.
7. **VAD/RH Operation:**
   - Proper care of Ladle handling & purging with Argon.
   - Placement of Ladle, taking of Sample & temperature.
   - At the end of heat disconnection of purging hose & taking out of ladle.
   - Job of electrode addition & slipping.
   - Loading of Ferro-Alloy at different bunkers.
   - Cleaning of Chamber car & housekeeping.
   - **Slag Circuit:** Movement of Slag Pot Transfer Cars, Cranes And Sending To Slag Yard.
   - Lime Coating
   - Releasing of Sticker Pots.
8. **Caster Operation (CCP):**
   - Receiving of Steel Ladles from Ladle Furnace / Converters.
   - Handling of Steel Ladles with Transfer Cars
   - Despatch of Heats with Addition Of Rice Husk
   - Placement Of Steel Ladle at Turret, Cylinder Fixing, Ladle, Nozzle Opening, Control & Quality of Steel Flow
   - Sample and Temperature Taking
   - Start of Casting both in Auto and in Manual Mode
   - Emergency Launder Handling
   - Mould Cleaning, Oil & Powder Addition during Casting
   - Machine Preparation (Mould Changing, Jam Cleaning by Lancing & Gas Cutting, Spray Nozzle Cleaning / Changing, Spray Pipe Changing, Dummy Bar Preparation, Dummy Bar Insertion etc.)
   - Slag Dumping, Ladle Nozzle Cleaning
   - Control Desks Operation

- Tundish Management (Release of Skull after Casting, Tundish Preparation, Tundish Heating, Nozzle Alignment etc.)
- Receiving and Placement of Slagpots on Slagpot Transfer Cars
- Knowledge of Despatch
- Mould Management (Cleaning, Placement, Water Checking, Other Preparatory Jobs)
- Housekeeping

9. **Calcination Plant Operation:**
   - Communication before starting any activity.
   - Practical application of safety in gas & related equipments (Operation of motorized valves, burner light up & gas line water sealing)
10. **Despatch Area:**
    - Storage & Inspection of Billets & Blooms.
    - Marking of & Demarcation of Different Grades.
    - Loading on different wagons & trailers.
    - Despatch & housekeeping

Note:

1. Industry must ensure that above mentioned competencies are achieved by the trainees during their on job training.
2. In addition to above competencies/ outcomes industry may impart additional training relevant to the specific industry.

ANNEXURE – I

INFRASTRUCTURE FOR PROFESSIONAL SKILL & PROFESSIONAL KNOWLEDGE

OPERATOR STEEL MELTING EQUIPMENTS			
LIST OF TOOLS AND EQUIPMENT for Basic Training (For 20 Apprentices)			
A. TRAINEES TOOL KIT (For each additional unit trainees tool kit Sl. 1-18 is required additionally)			
Sl. no.	**Name of the Tool &Equipments**	**Specification**	**Quantity**
1	As per training need the tools & equipment.		

INFRASTRUCTURE FOR WORKSHOP CALCULATION & SCIENCE AND ENGINEERING DRAWING

TRADE: OPERATOR STEEL MELTING EQUIPMENTS

LIST OF TOOLS& EQUIPMENTS FOR -20APPRENTICES

1) **Space Norms** : 45 Sq. m.(For Engineering Drawing)

2) Infrastructure:

A : TRAINEES TOOL KIT:-			
Sl. No.	**Name of the items**	**Specification**	**Quantity**
1.	Draughtsman drawing instrument box		20+1 set
2.	Set square celluloid 45^o	(250 X 1.5 mm)	20+1 set
3.	Set square celluloid 30^o-60^o	(250 X 1.5 mm)	20+1 set
4.	Mini drafter		20+1 set
5.	Drawing board IS: 1444	(700mm x500 mm)	20+1 set
B : Furniture Required			
1	Drawing Board		20
2	Models : Solid & cut section		as required
3	Drawing Table for trainees		as required
4	Stool for trainees		as required
5	Cupboard (big)		01
6	White Board (size: 8ft. x 4ft.)		01
7	Trainer's Table		01
8	Trainer's Chair		01

TOOLS & EQUIPMENTS FOR EMPLOYABILITY SKILLS		
Sl. No.	**Name of the Equipment**	**Quantity**
1.	Computer (PC) with latest configurations and Internet connection with standard operating system and standard word processor and worksheet software	10 Nos.
2.	Fnco UPS - 500VA	10 Nos.
3.	Scanner cum Printer	1 No.
4.	Computer Tables	10 Nos.
5.	Computer Chairs	20 Nos.
6.	LCD Projector	1 No.
7.	White Board 1200mm x 900mm	1 No.
Note: - Above Tools & Equipments not required, if Computer LAB is available in the institute.		

ANNEXURE-II

FORMAT FOR INTERNAL ASSESSMENT

Name & Address of the Assessor :			**Year of Enrollment :**
Name & Address of ITI (Govt./Pvt.) :			**Date of Assessment :**
Name & Address of the Industry :			**Assessment location: Industry / ITI**
Trade Name :	**Semester:**		**Duration of the Trade/course:**
Learning Outcome:			

Sl. No	**Candidate Name**	**Father's/Mother's Name**	Safety consciousness **15**	Workplace hygiene **5**	Attendance/ Punctuality **10**	Ability to follow Manuals/ Written instructions **5**	Application of Knowledge **10**	Skills to handle tools & equipment **10**	Economical use of materials **5**	Speed in doing work **10**	Quality in workmanship **15**	VIVA **15**	**Total internal assessment Marks**	**Result (Y/N)**
Maximum Marks (Total 100 Marks)														
1														
2														